IN THE CLAIMS

Please amend the claims as follows.

1. (Currently Amended) A method for positioning of ~~an audio signal~~ a plurality of audio signals, the method including ~~comprising~~:

selecting a set of spatial functions, each having an associated scaling factor;

providing a first set of amplifiers and a second set of amplifiers, the gains of the amplifiers being [[a]] functions of the scaling factors;

receiving a first audio signal of the plurality of audio signals;

providing a first direction representing the direction of the source of the first audio signal;

adjusting the gains of the first and the second set of amplifiers ~~scaling factors~~ depending on the first direction;

applying the first set of amplifiers to the first audio signal to produce first encoded signals ~~to provide a left-channel audio output~~;

delaying the first audio signal to produce a first delayed audio signal; and

applying the second set of amplifiers to the first delayed audio signal to produce second encoded signals ~~to provide a right-channel audio output, the left-channel audio output excluding the second encoded signals and the right-channel audio output excluding the first encoded signals.~~;

providing a third set of amplifiers and a fourth set of amplifiers, the gains of the amplifiers being functions of the scaling factors;

receiving a second audio signal of the plurality of audio signals;

providing a second direction representing the direction of the source of the second audio signal;

adjusting the gains of the third and the fourth set of amplifiers depending on the second direction;

applying the third set of amplifiers to the second audio signal to produce third encoded signals;

delaying the second audio signal to produce a second delayed audio signal;

applying the fourth set of amplifiers to the second delayed audio signal to produce fourth encoded signals;

mixing the first and the third encoded signals or the first and the fourth encoded signals to provide a left-channel audio output;

mixing the second and the fourth encoded signals or the second and the third encoded signals to provide a right-channel audio output, the left-channel audio output excluding the second encoded signal and the right-channel audio output excluding the first encoded signal; and

decoding the encoded signals using filters that are defined based on the spatial functions.

2. (Original) The method of claim 1 wherein the spatial functions are spherical harmonic functions.

3. (Original) The method of claim 2 wherein the spherical harmonic functions include at least the first-order harmonics.

4. (Original) The method of claim 1 wherein the spatial functions are discrete panning functions.

5. (Previously Presented) The method of claim 1 wherein for each of the first and second sets of amplifiers, the gain of each amplifier is based on a B-format encoding scheme.

6. (Canceled)

7. (Currently Amended) The method of claim 1 [[6]] wherein the second signal is a synthesized audio signal.

8.-19. (Canceled)

20. (Currently Amended) A method of producing an audio signal from directionally encoded multi-channel audio signals, the method including:

selecting a set of spatial functions;

generating a set of spectral functions based on the spatial functions;

receiving a first set of directionally encoded audio signals encoded according to the set of spatial functions, the first set of directionally encoded signals providing an encoded left-channel input;

receiving a second of set directionally encoded audio signals encoded according to the set of spatial functions, the second set of directionally encoded signals providing an encoded right-channel input, the encoded left-channel input excluding the second set of directionally encoded signals and the encoded right-channel input excluding the first set of directionally encoded signals;

providing a first set of decoding filters defined by the set of spectral functions;

providing a second set of decoding filters defined by the set of spectral functions;

applying the first set of decoding filters to the first set of directionally encoded audio signals to produce a first set of filtered signals;

applying the second set of decoding filters to the second set of directionally encoded audio signals to produce a second set of filtered signals; and

providing the first set of filtered signals to a left-channel audio output ~~signal~~ and providing the second set of filtered signals to a right-channel audio output ~~signal, the left-channel audio signal excluding the second set of filtered signals and the right-channel audio signal excluding the first set of filtered signals~~.

21. (Previously Presented) The method of claim 20 wherein the set of spatial functions is defined by $\{g_i(\theta, \varphi), i = 0, 1, \ldots N\text{-}1\}$ and generating the spectral functions includes providing $L_i(f)$ and $R_i(f)$ such that $\Sigma_{\{i=0,\ldots N-1\}}\, g_i(\theta_p, \varphi_p)\, L_i(f)$ approximates $\underline{L}(\theta_p, \varphi_p, f)$ and $\Sigma_{\{i=0,\ldots N-1\}}\, g_i(\theta_p, \varphi_p)\, R_i(f)$ approximates $\underline{R}(\theta_p, \varphi_p, f)$, where $\underline{L}(\theta_p, \varphi_p, f)$ is a set of left-ear HRTFs and $\underline{R}(\theta_p, \varphi_p, f)$ is a set of right-ear HRTFs, where $\{(\theta_p, \varphi_p), p = 1, 2, \ldots P\}$ is a set of directions and f is frequency.

22. (Original) The method of claim 21 wherein $\underline{L}(\theta_p, \varphi_p, f)$ and $\underline{R}(\theta_p, \varphi_p, f)$ are delay-free HRTFs.

23. (Previously Presented) The method of claim 21 wherein providing $L_i(f)$ includes solving, at each frequency f, the vector equation $\underline{L} \cong GL$,, where:

the set of left-ear HRTFs $\underline{L}(\theta_p, \varphi_p, f)$ define a Px1 vector $\underline{L}$,

$\boldsymbol{G}$ is a PxN matrix whose columns are Px1 vectors $\underline{G_i}$, $i = 0, 1, \ldots N-1$
each of the N spatial functions $g_i(\theta_p, \varphi_p, f)$ defines the vector G_i, and
the set of $L_i(f)$ defines the Nx1 vector L.

24. (Previously Presented) The method of claim 23 wherein providing $L_i(f)$ is obtained by pseudo-inversion of the matrix $\boldsymbol{G}$, resulting in $L = (\boldsymbol{G}^{T}\boldsymbol{G})^{-1}\boldsymbol{G}^{T}\underline{L}$.

25. (Previously Presented) The method of claim 24 wherein providing $L_i(f)$ includes projecting the Px1 vector $\underline{L}$ formed by the set of left-ear HRTFs $\underline{L}(\theta_p, \varphi_p, f)$ over each of the Px1 vectors G_i formed by the spatial functions $\underline{g_i}(\theta_p, \varphi_p)$ to compute the scalar product L_i.

26. (Original) The method according to claim 25 wherein an Nx1 vector L formed by the scalar products L_i is multiplied by the inverse of the Gram matrix $\boldsymbol{G}^{T}\boldsymbol{G}$.

27. (Original) The method of claim 23 wherein providing $L_i(f)$ is obtained by $L = (\boldsymbol{G}^{T}\boldsymbol{\Delta G})^{-1}\boldsymbol{G}^{T}\boldsymbol{\Delta}\underline{L}$ where $\boldsymbol{\Delta}$ is a diagonal PxP matrix where the P diagonal elements are weights applied to the individual directions (θ_p, φ_p), $p = 1, 2, \ldots P$.

28. (Previously Presented) The method of claim 27 where each weight is proportional to a solid angle associated with the corresponding direction.

29. (Previously Presented) The method of claim 20 wherein the spatial functions are spherical harmonic functions.

30. (Previously Presented) The method of claim 29 wherein the spherical harmonic functions include at least zero- and first-order harmonics.

31. (Previously Presented) The method of claim 30 wherein the spectral functions define filters $L_W(f)$, $L_X(f)$, $L_Y(f)$, and $L_Z(f)$ effective for decoding binaural B-format encoded signals W_L, X_L, Y_L, Z_L W_R, X_R, Y_R, and Z_R, wherein the left-channel audio signal is defined by $W_L L_W(f) + X_L L_X(f) + Y_L L_Y(f) + Z_L L_Z(f)$ and the right-channel audio signal is defined by $W_R L_W(f) + X_R L_X(f)$ -

$Y_R L_Y(f) + Z_R L_Z(f)$; whereby the left- and right-channel audio signals are suitable for playback with headphones.

32. (Previously Presented) The method of claim 30 wherein the spectral functions define filters $L_W(f)$, $L_X(f)$, $L_Y(f)$, and $L_Z(f)$ effective for decoding binaural B-format encoded signals W_L, X_L, Y_L, Z_L W_R, X_R, Y_R, and Z_R; wherein the left-channel audio signal comprises two signals

a first signal $LF = 0.5\{[W_L + X_L][L_w(f) + L_X(f)] + Y_L L_Y(f) + Z_L L_Z(f)\}$ and

a second signal $LB = 0.5\{[W_L - X_L][L_W(f) - L_X(f)] + Y_L L_Y(f) + Z_L L_Z(f)\}$;

and wherein the right-channel audio signal comprises two signals

a first signal $RF = 0.5\{[W_R + X_R][L_W(f) + L_x(f)] + Y_R L_Y(f) + Z_R L_Z(f)\}$ and

a second signal $RB = 0.5\{[W_R - X_R][L_W(f) - L_X(f)] - Y_R L_Y(f) + Z_R L_Z(f)\}$;

whereby the left- and right- channel audio signals are suitable for playback over a pair of front speakers and a pair of rear speakers.

33. (Original) The method of claim 32 further including:

performing a first cross-talk cancellation on the *LF* and *RF* signals to feed the front speakers; and

performing a second cross-talk cancellation on the *LB* and *RB* signals to feed the rear speakers.

34. (Original) The method of claim 20 wherein the spatial functions are discrete panning functions having a direction, called a principal direction, where the spatial function is maximum and wherein all other spatial functions are zero.

35. (Original) The method of claim 34 wherein the spectral function associated with each spatial function is the delay-free HRTF for the corresponding principal direction.

36. (Previously Presented) The method according to claims 34 or 35 wherein one or more of the spatial functions have their principal direction corresponding to a direction of one of the loudspeakers.

37. (Original) The method according to claims 33 or 36 including performing cross-talk cancellation of the left and right audio signals before feeding the loudspeakers.

38. (Original) The method of claims 34 or 35 further including:

producing left-front and left-back signals based on the left-channel audio signal;

producing right-front and right-back signals based on the right-channel audio signal; and

combining the left-front, left-back, right-front, and right-back signals to produce outputs suitable for playback with a pair of front speakers and a pair of rear speakers.

39. (Original) The method of claim 38 further including:

performing a first cross-talk cancellation on the left-front and right-front signals to feed the front speakers; and

performing a second cross-talk cancellation on the left-back and right-back signals to feed the rear speakers.

40. (Previously Presented) The method of claim 39 wherein one or more of the spatial functions have their principal direction corresponding to the direction of a loudspeaker.

41.-49. (Canceled)